receive HARQ TB, wherein only ACK is fed back to the serving base station by individual cluster members.

[0075] According to yet another exemplary embodiment, there is provided a base station comprising at least one processor; and at least one memory including a computer program code, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to, at least one group of mobile devices operating as a device-to-device cluster having a currently elected cluster head device, configure for the device-to-device cluster, a cluster-specific cell-level radio network temporary identifier C-RNTI on the basis of each content-sharing service requested within the device-to-device cluster, wherein the cluster-specific cell-level radio network temporary identifier C-RNTI acts as a cluster-specific virtual radio access user responsible for transmission between a serving base station and the currently elected cluster head device on behalf of the device-to-device cluster.

[0076] According to yet another exemplary embodiment, the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to perform a cluster-level ensuring of correct packet transmissions as required for the content-sharing service.

[0077] According to yet another exemplary embodiment, the base station is responsible for selecting and allocating RRC-connected cluster members for necessary receptions and/or transmissions between the cluster and the base station, which receptions and/or transmissions are scheduled for the cluster-specific cell-level radio network temporary identifier C-RNTI and within the cluster.

[0078] According to yet another exemplary embodiment, the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to perform the selecting based on one or more of the following characteristics of an individual member of the cluster: a cellular access state, channel condition, battery status, service demand, service requirement, resource allocation, and device capability, wherein said one or more characteristics are evaluated against a cluster size, traffic demand, and characteristics of the cluster-specific virtual radio access user so as to optimize selective gain with best suitable members selected.

[0079] According to yet another exemplary embodiment, the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to make said one or more characteristics of the individual member of the cluster available at the cluster head device.

[0080] According to yet another exemplary embodiment, the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to assist in selecting RRC-connected cluster members by transmitting to the cluster head device recommendations and/or inputs for decision making, such as context information and resource allocation information on the RRC-connected cluster members.

[0081] According to yet another exemplary embodiment, the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to receive information on the cell-level radio network temporary identifiers C-RNTI of the selected RRC-connected cluster members.

[0082] According to yet another exemplary embodiment, the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to perform the allocating by distributing and dedicating HARQ processes from a configured collective pool to the selected cluster members in order them to be able to receive and transmit for the cluster.

[0083] According to yet another exemplary embodiment, there is provided a computer program product comprising program code means adapted to perform any one of the method steps when the program is run on a computer.

[0084] It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

LIST OF ABBREVIATIONS

[0085] C-RNTI cell-level radio network temporary identifier

[0086] D2D device-to-device

[0087] ProSe proximity service

[0088] ACK acknowledgement

[0089] NACK negative acknowledgement

[0090] HARQ hybrid automatic repeat request

[0091] eNB enhanced node-B

[0092] UE user equipment

[0093] CH cluster head

[0094] PUCCH physical uplink control channel

[0095] TB transport block

[0096] RRC radio resource control

[0097] L1 layer-1

[0098] L2 layer-2

[0099] DL downlink

[0100] UL uplink

[0101] LTE long term evolution

[0102] LTE-A advanced long term evolution

[0103] IP internet protocol

[0104] 3GPP third generation partnership project

[0105] Rel-12 release-12

[0106] UMTS universal mobile telecommunications system

[0107] GSM global system for mobile communications

[0108] EDGE enhanced data rates for GSM evolution

[0109] WCDMA wideband code division multiple access

[0110] WLAN wireless local area network

[0111] RTT round trip time

1-39. (canceled)

40. A method for providing an ad-hoc network, wherein at least one group of mobile devices operating as a device-to-device cluster having a currently elected cluster head device, the method comprising:

configuring, in a network apparatus for the device-to-device cluster, a cluster-specific cell-level radio network temporary identifier C-RNTI on the basis of each content-sharing service requested within the device-to-device cluster, wherein the cluster-specific cell-level radio network temporary identifier C-RNTI acts as a cluster-specific virtual radio access user responsible for transmission between a serving base station and the currently elected cluster head device on behalf of the device-to-device cluster.

41. A method as claimed in claim **40**, wherein the cluster-specific cell-level radio network temporary identifier